Avian Diversity Roosting and Nesting Patterns in Rural and Urban Landscape : A Comparative Analysis in and Around Gangakhed

A

Synopsis

Submitted to

Swami Ramanad Teerth Marathwada University,

Nanded – 431606 (M.S)

For the registration of

Doctor of Philosophy

In

Zoology

(Faculty of Science & Technology)

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Introduction:

Avian diversity is essential for maintaining a healthy ecosystem. Birds play important roles in pollination, seed dispersal, and pest control. Understanding their roosting and nesting habits is vital for conservation efforts and habitat management. Birds constitute one of the frequently occurring faunas found in all types of habitats and are responsive to changes in the environment. Thus, their diversity and abundance can reflect ecological trends in the diversity of other organisms of the ecosystem (Furness and Greenwood, 1993). The study of avian diversity is an important ecological tool, which acts as an important indicator to estimate the different habitats both qualitatively and quantitatively (Bilgrami, 1995). Birds are considered ecological indicators and the most sensitive health indicators of an ecosystem (Joshi and Shrivastava, 2012). They also fulfil many ecological functions such as disease regulation, biomass recycling, seed dispersal of fleshy fruits, and pollination (Stevenson *et al.,* 2002 and Judd *et al.,* 2008). Urbanization is one of the main driving factors for the degradation of natural wetlands but, its effect on bird diversity may be reduced by the presence of wetlands, which may provide enhanced habitat and increase resource availability (Russi *et al.,* 2013). Most of the birds feed on aquatic organisms as well as on soil macro-invertebrates and water-dependent vertebrates, these interactions among water, soil, and biodiversity describe the complexity of wetland ecosystems (Sharma *et al.,* 2016). The food chain is the main link between wetland quality and ecosystem health, waterbird activities are the key indicator toward it (Kar and Debata, 2019). By occupying several trophic levels in the nutrient cycle of wetlands, aquatic birds become an important component of the wetland ecosystem (Panda *et al.,* 2019, 2020).

Review of literature:

The peak population of birds is noticed during the migratory season whereas, a decrease in bird population during the non-migratory season is recorded (Acharya, 2000) . Black headed Ibis used different habitats ranging from agricultural landscapes, densely-populated cities and several kinds of natural and artificial wetlands (Sundar, 2006 and Chaudhury and koli, 2016). According to Blanco 1996 reports, when human activities dominate landscapes, the presence of novel foraging sites such as rubbish dump, well-watered gardens, and swimming pools, and exotic tree species can be attractive for many bidd species and eventually may alter roosting in natural. In natural habitats, water birds roost location can be influenced by proximity to foraging habitats such as wetlands and grasslands (Pearson *et al.,* 1092), and large tall trees (Blanco 1996 and Chevallier *et al.*, 2010) .

National status:

In 2003 Kumar *et al,* reported that out of 242 Indian water bird species 125 are migrant, 109 are resident, while the status of eight species is not known and of the 125 migrants, 102 species are winter migrants, five species of winter migrants are also resident, five species with some passage population, ten species are summer migrant and the remaining three species are purely passaged migrant. Manaknanda and Pittie in 2001 reported a total of 242 species of wate rbirds and 67

species of wetland-dependent birds from India. Sumant et al, 2019 reported a total of 211 bird species from Pune, out of the 131 are resident, 76 are migratory and 9 are local migrants. Birds that visit Pune include black-winged stilt, ducks, wagtails, waders, sandpipers, redshank and greenshank, greenish warbler, and red-throated flycatcher (Sumant *et al.,* 2019). Pawar *et al,* 2009 reports that, in the last 15 years, there has been a significant decline in the number of birds visiting freshwater bodies in Pune, including bar-headed geese and ruddy shelducks.

International status:

According to a recent survey covered by African-Eurasian Migratory Waterbird Agreement (AEWA) in 2018, 60 percent species population is stable or increasing. Pelicans, cormorants, avocets and stilts, flamingos, and storks are the waterbird families with the highest proportion of increasing populations whereas; crane and auk numbers are in strong decline (AEWA, 2018) and the highest proportion of populations on the Endangered IUCN Red List is in Eastern and Southern Africa. At least 180 species of Asia's migratory land birds are being trapped for food, the cage bird trade, or some other uses (BirdLife International report, 2021). Sievers *et al*, 2018 reports that the declines in wetland-dependent species have been some of the greatest recorded, and wetland birtirds, in particular, are sensitive indicators of wetland conditions. The adaptation can be possible for the non-native bird species to urban and suburban conditions when the urban habitats are highly modified (Mckinney, 2005).

Objective of Research :

1. To access and compare the avian diversity in rural and urban landscapes of Gangakhed and its surrounding areas.
2. To study the roosting patterns of birds in rural and urban areas including the types of structures used for roosting and the timing of roosting.
3. To investigate the nesting patterns of birds in rural and urban areas, including the types of trees or structures used for nesting, nest architecture, and breeding success.
4. To identify the key factors influencing avian diversity, roosting, and nesting patterns in rural and urban landscapes.
5. To compare the abundance and distribution of birds species in rural and urban areas.
6. To access the impact of urbanization on avian diversity, roosting, and nesting patterns.

Methodology :-

Sampling sites:

A sampling of birds will be done from six different wetlands, three from rural sites and three from urban areas of Gangakhed

Area search—A method in which observers are allowed to roam for a fixed time in a specified area, usually 20 minutes per 3 hectare area (Loyn 1986, Slater 1994). This technique has a wide appeal to volunteers but standardization of data collection is difficult.

Point counts—Fixed radius point counts are the basic method recommended for most monitoring studies, and are most widely used (Hutto et al. 1986, Ralph et al. 1993, Ralph et al. 1995). These can provide a cost-effective method of estimating the relative abundance of birds.

Line transects—Fixed-width transects can provide coverage of a greater area than point counts, but with fewer independent data points or replicates.

Variable distance methods—Estimating distance at which birds are detected can be incorporated into both point count and line transect surveys. Standardization of distance estimation may be difficult, as abilities to accurately estimate distances may vary greatly between observers.

Spot-mapping—Can provide good density information and information on many aspects of avian life history. It is expensive per data point and may be better applied to research projects or to high priority areas or species.

Importance of study:

Birds are the ecological indicators of the ecosystem. There are many manmade and natural water bodies in and around Gangakhed that could provide shelter, food, and nesting and roosting sites for native aquatic birds as well as too many important migratory birds. The fast process of urbanization and increased anthropogenic activities could lead to loss of habitat for birds and could cause threats to their existence causing a decline in their diversity. This may lead to an imbalance in the ecosystem. As per our previous studies in Gangakhed we observed that few species of birds are being adapted to the urban environment.

However, anthropogenic activities and changed ecological parameters in urban wetlands affect aquatic bird diversity and migratory birds are not studied in Gangakhed and the surrounding area in the last few years. Further, the study of a selection of nesting and roosting sites in urban areas is important in the view of conservation of the environment. Therefore, the comparative analysis of aquatic birds at urban wetland and rural wetland will be done. The preferences of the birds to nesting and roosting sites in urban and rural areas will also be studied. The present study will

help to make clear how urbanization affects the aquatic birds, their behaviour as per as nesting and roosting are a concern and the present study will also show light on the adaptation of the birds to a new environment if any. Thus, the present study will help to generate baseline data regarding the impact of urbanization on aquatic birds for further conservation measures and habitat management.

Roosting

Roosting is the behavior of birds gathering in large numbers at night or during rest periods. Roost sites provide safety, thermoregulation, and social interaction. Factors influencing roost site selection include:

* Predation risk: Birds seek safe locations away from predators.
* Thermoregulation: Roosting in groups helps conserve body heat.
* Social factors: Roosting in flocks can provide information about food sources and potential mates.

Nesting

Nesting is the process of building a structure for egg-laying and raising young. Nest characteristics vary widely depending on species and habitat. Key factors influencing nest site selection include:

* Nest predation risk: Birds choose locations that minimize predation threats.
* Resource availability: Nests are often built near food sources and water.
* Microclimate: Nests are constructed in areas with suitable temperature and humidity.

Challenges and Threats:

Avian diversity faces numerous threats, including:

Habitat loss and degradation: Deforestation, urbanization, and agricultural expansion are major threats to bird habitats.

Climate change: Changing climate patterns can disrupt breeding cycles, migration patterns, and food availability for birds.

Pollution: Air, water, and soil pollution can harm birds directly or indirectly through the food chain.

Invasive species: Introduced species can compete with native birds for resources and prey on them.

Unsustainable hunting and trapping: Illegal hunting and trapping of birds for food, pets, or traditional medicine remain a significant threat in some regions.

Proposed work plan and tentative chapter scheme:

First Year

Literature survey

Purchasing of Binocular and Camera

Standardization of methodologies

Permission from District forest department and Municipal Corporation for fieldwork

Course work

Second Year :
Fieldwork and bird sampling in rural wetlands

Fieldwork and bird sampling in urban wetlands

Vegetation sampling

Analysis of physic-chemical parameters of water samples

Third year :
Fieldwork and bird sampling in rural wetlands

Fieldwork and bird sampling in urban wetlands

publications in journals

Presentation in conferences

Statistical analysis of data and compilation of thesis

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